CS 478/564 COMPUTATIONAL GEOMETRY (Spring 2019-2020)

Instructor: Uğur Güdükbay
Office Hours: Monday 9:40-10:30, Wednesday 9:40-10:30 (EA-403)
Course Schedule: Tuesday 13:40, 14:40, Thursday 15:40, 16:40 (Spare Hour) (EE-03)
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Please visit the course homepage frequently to see the announcements about the course and assignments.

SYLLABUS

1. Introduction
   • Algorithmic Background
   • Data Structures
   • Geometric Preliminaries
   • Models of Computation

2. Geometric Searching
   • Introduction
   • Point-Location Problems
   • Range-Searching Problems

3. Convex Hulls
   • Preliminaries
   • Problem Statement and Lower Bounds
   • Convex Hull Algorithms in the Plane
   • Graham’s Scan
   • Jarvis’s March
   • Quick Hull techniques
   • Dynamic Convex Hull
   • Convex Hull in 3D

4. Proximity Problem
   • A Collection of Problems
   • A Computational Prototype: Element Uniqueness
   • Lower Bounds
   • The Closest-Pair Problem: A Divide-and-Conquer Approach
   • The Voronoi Diagram
   • Proximity Problems Solved by the Voronoi Diagram
5. Triangulation
   • Planar Triangulations
     – Greedy Triangulations
     – Partitioning a Polygon into Monotone Pieces
     – Triangulating a Monotone Polygon
   • Delaunay Triangulation

6. Intersections
   • Application Areas
   • Planar Applications: Intersection of Convex Polygons, Star-shaped Polygons; Intersection of Line Segments.
   • 3D Applications: Intersection of 3D Convex Polyhedra; Intersection of Half-spaces

TEXTBOOK INFO
Main Textbooks:


References:


GRADING: (Tentative)

• Midterm 20 %,
• Final 30 %,
• Assignments 20 %,
• Project 25 %,
• Attendance 5 %